



A.D. 1824 N^o 4950.

S P E C I F I C A T I O N

OF

JOHN THEODORE PAUL.

TUBULAR STEAM BOILER.

L O N D O N :

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Tubular Steam Boiler.

PAUL'S SPECIFICATION.

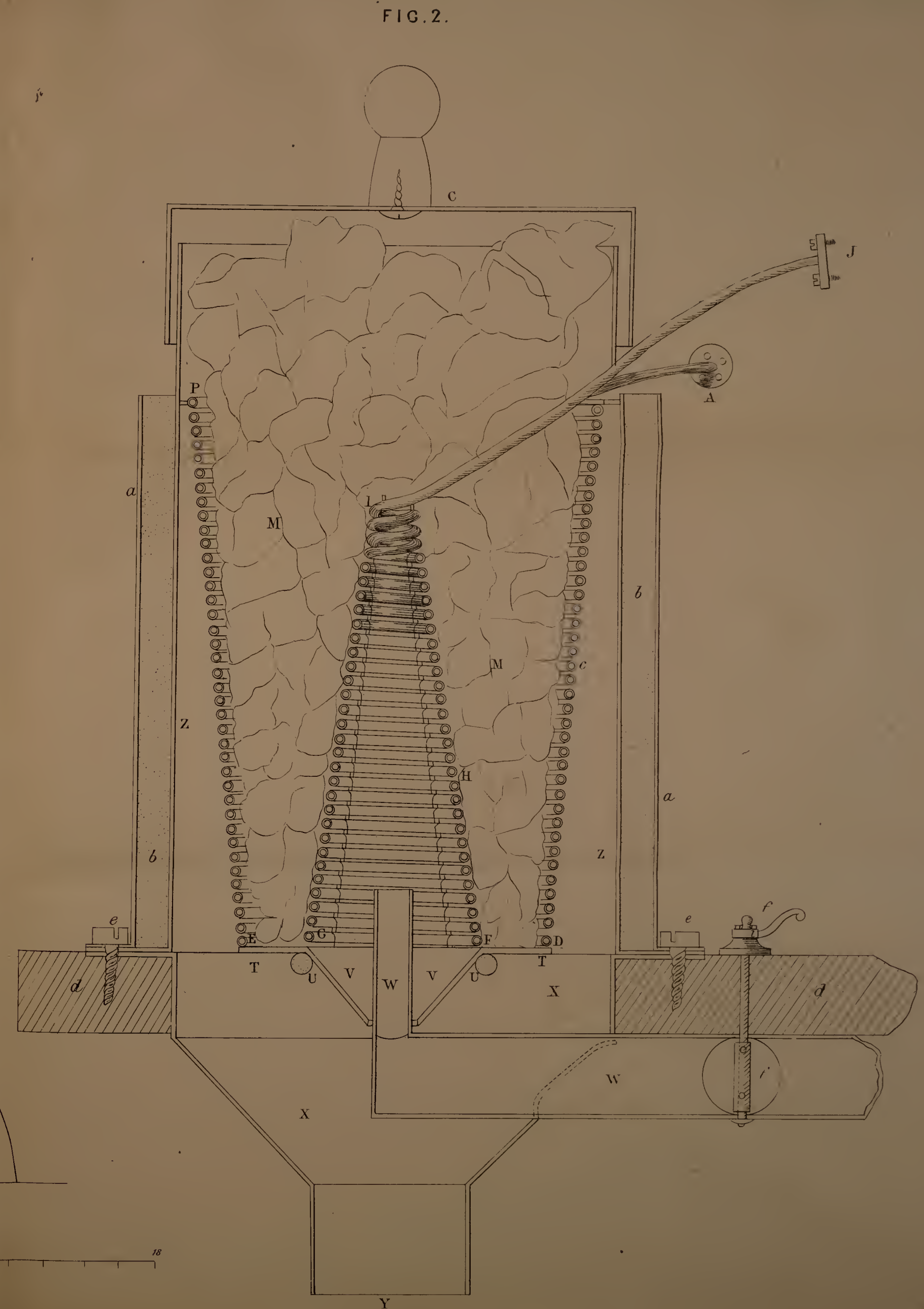
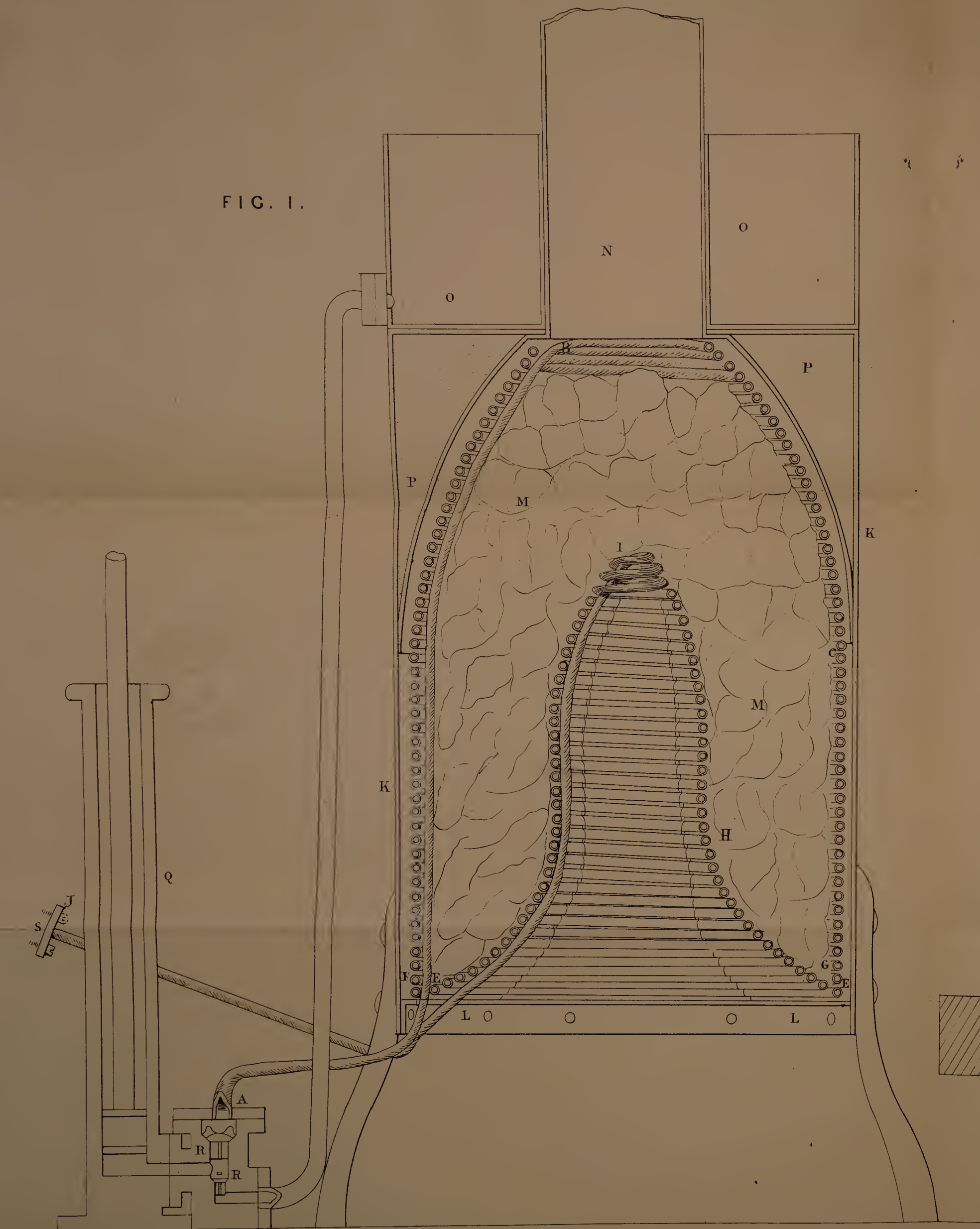
TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JOHN THEODORE PAUL, of Genova, but now residing at Charing Cross, Westminster, in the County of Middlesex, Mechanist, send greeting.

WHEREAS His present most Excellent Majesty King George the Fourth,
5 by His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Thirteenth day of May, in the Fifth year of His reign, did, for Himself, His heirs and successors, give and grant unto me, the said John Theodore Paul, His especial licence, that I, the said John Theodore Paul, my exors, admors, and assigns, or such others as I, the said John Theodore
10 Paul, my exors, admors, and assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, the Invention of
“CERTAIN IMPROVEMENTS IN THE METHOD OR METHODS OF GENERATING STEAM, AND
15 IN THE APPLICATION OF IT TO VARIOUS USEFUL PURPOSES,” communicated to me by a certain foreigner residing abroad ; in which said Letters Patent there is contained a proviso obliging me, the said John Theodore Paul, by an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of the said Invention, and in what manner the same is to be performed, and to
20 cause the same to be inrolled in His Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part-recited Letters Patent, reference being thereunto had, will more fully and at large appear.

Paul's Improvements in Generating Steam for Various Purposes.

NOW KNOW YE, that in compliance with the said proviso, I, the said John Theodore Paul, do hereby declare that the nature of the said Invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the Drawing hereunto annexed, and the following description thereof (that is to say) :—

The said Invention, for which a French Brevet de Invention for fifteen years, has been granted to Mess^{rs} Revon and Moulinie, of Paris, in December One thousand eight hundred and twenty-three, consists of a method of converting water into high pressure steam, by exposing it to the action of heat in a long continuous metal pipe of a small diameter; and into one end of which pipe the water being forced or injected will pass out at the other end of it in the state of high pressure steam. The length of the pipe forming this boiler, whatever may be its diameter, ought to be such, that being heated throughout its whole length to a heat below redness, the water that is, as before-mentioned, forced into it at one end of it shall pass out at the other end in a state of steam of such elastic force as shall be sufficient for the work it is to perform; a pipe calculated to supply an engine of the power of two horses should be at least one hundred and fifty feet long. The diameter of the pipe, whatever may be its length, ought to be as small as possible, provided that the quantity of steam generated within it in a certain time be sufficient to perform the work required. A copper pipe to supply an engine of the above power should be at least three-sixteenths of an inch in its internal diameter, and one-sixteenth of an inch in thickness. In the annexed Drawing, Fig^s 1 and 2 represent two pipe boilers constructed upon the before-mentioned principles, each of them being calculated to produce sufficient steam for working an engine of the power of two horses under the pressure of one hundred and fifty pounds upon the square inch. Fig. 1 is the section of a boiler, &c.; A, B, C, D, E, F, G, H, I, J, is a single continuous pipe coiled in a circular manner in the form represented; K, K, an external casing formed of sheet iron or other fit and proper material or materials; this is intended to prevent the escape of the heat, and to support the coil of pipe upon the flange L, L; that part of the coiled pipe which is marked H, F, G, I, is so constructed as to operate as a grate to support the fuel; M, M, the fuel which is thrown into the fireplace, either at the chimney N, when it is only of a moderate length, or at a door; O, O, a circular reservoir to contain water for supplying the injecting pump; P, P, brick dust or coal ashes; Q, the forcing or injecting pump; R, R, the valve box and valves; S, a flange at the end of the coiled pipe out of which the steam rushes, under a high pressure. The fire being lighted and the pipe sufficiently heated, the pump must be worked; the water will then be



1 2 3 4 5 6 7 8 9 10 11 12 inches
one foot

The enrolled drawing is not colored.

Drawn and Stamped by Malby & Sons

Paul's Improvements in Generating Steam for Various Purposes.

drawn from the reservoir O, O, and pass through the upper valve R, into the coil of the pipe at A, from whence it will pass to the top of the outer part of the coil at B, where it will be gently heated, then become more strongly heated, following the course of the letters C, D, E, F, G, H, I, and expanding into
5 steam, which in its course becomes more and more heated, and continually a greater elastic power or force, it finally escapes from the boiler at J, and is conveyed to the engine, &c. Fig. 2 represents the section of another pipe boiler, &c., which is coiled and heated in a different manner from that before described, and is calculated to be used for steam boats, steam
10 carriages, &c., where chimnies cannot be employed. In this boiler the pipe is coiled in the forms of two framstrums of cones of different sizes, the larger one having its wider part at top, and the smaller one or inner cone at the bottom. These are set firm upon a metal disc T, T, which is supported upon four wires, two of which are shewn in section at U, U. This disc is
15 partly closed below by being formed into a funnel V, V; into this funnel the pipe W enters, which conveys a current of air to the fire; a small space should be left around this pipe for any cinders or ashes that may fall into the funnel V, to be blown through and descend into the lower funnel X, from whence they can escape at its opening Y; the whole boiler is inclosed within two concentric
20 metal cylinders Z a, the space between which is to be filled up, either with brick-dust or coal ashes b, b. The inner cylinder Z, Z, which may be of any length required, extends above the outer one, and is closed by a cover e. This inner cylinder and funnel X must be secured upon a proper basis d, by means of the screws e, e, or otherwise. The fuel M, M, is contained between the
25 two concentric cones of pipe, the space within the smaller cone being left empty to receive the current of air from the pipe W. The fuel either descends by its own weight as it consumes below, or it may be forced down occasionally; and the cinders or ashes which escape between the interstices in the outer coil of the pipe are discharged through the lower funnel X. The forcing or pro-
30 jecting pump is to be applied to the end A of the continuous pipe, and the high pressure steam will pass out at the other end of it J, as in the boiler already described. f is a register for the air. The fire being lighted, a gentle current of air is caused to pass through the pipe W by any known method, as from bellows, &c.; this air passes between the sterstices of the inner coil of the pipe
35 into the fire; the carbonic acid, &c. formed by the combustion, will pass through the interstices of the outer coil of the pipe, and descend between them and the casing Z, Z, from whence they will escape through the opening Y into the open air. For supplying engines of greater powers, more than one pipe boiler may be used, and those may be heated either in the same or in separate

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furnaces ; and they may also be heated by the immediate contact with the fuel by the radiant heat from it, by the flame of gass, by the heated air, &c., proceeding from smelting or other furnaces, or by any other fit and proper means. The size, shape, or construction of the furnaces may also be varied considerably according to circumstances, as may likewise be the arrangement of the 5 coils of pipe, provided that the boiler consists of one entire or continuous pipe, or of one or more pipes united firmly together so as to form one continued pipe from the end where the water enters it, to the other end where the high pressure steam rushes out. The pipe or pipes may also be made of any other fit and proper materials besides copper, such as platina, gold, silver, 10 &c., but in such cases the proportions, in regard to their length, diameter, and thickness, must be varied accordingly. So also pipes of copper might be made of other dimensions than those above described, but which, however, have been found by experience to be the most convenient for engines of the power mentioned. The exterior surface of the coil of pipe may be coated with 15 a layer of clay or any other fit and proper substance not liable to be acted upon by the heat of the furnace, with a view to prevent the oxidation of the pipe.

In witness whereof, I, John Theodore Paul, have hereunto set my hand and seal, this Thirteenth day of November, in the year of our Lord One thousand eight hundred and twenty-four.

20

J. TH^{RE} PAUL. (L.S.)

AND BE IT REMEMBERED, that on the Thirteenth day of November, in the year of our Lord 1824, the aforesaid John Theodore Paul came before our said Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Inrolled the Thirteenth day of November, in the year of our Lord One thousand eight hundred and twenty-four.

LONDON :

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Printers to the Queen's most Excellent Majesty. 1854.